DISCUSSION

EUGENE S. KILGORE, M. D. (490 Post Street, San Francisco).—Doctor Langley's observations of physicians contain implications of wider significance. Essentially, he has depicted cardiovascular degenerative disease in a limited class. Part of the apparent increase in incidence may be debatable, *i. e.,* may be attributed to changing fashions of diagnoses as they appear on death certificates. But this applies equally to other portions of the population, and there appears to be no escape from the main conclusion that doctors fare badly in comparison with other groups. The reasons for this suggested by Doctor Langley are plausible to a degree, but not very convincing; for why should not the irregular meals cause digestive discomfort rather than arteriosclerosis: are not many other groups more exposed to inclement weather than the modern doctor in his closed car, and do not other professional men and business men have their worries perhaps as much as the doctor even if not his irregular hours of sleep?

And if the doctor's handicap is not impressive, he might be expected, *per contra,* to have a very great advantage. He is the repository of all that science can tell of how to prevent and control arteriosclerosis. Despite the shocking examples here described, he is, we trust, not below the general average in intelligence and prudence. So then this is the depressing general implication of the picture presented by Doctor Langley: that we know little and/or that we can or will use little of what we know about the prevention and treatment of degenerative disease. Not flattering, not comforting, not "constructive criticism," but truth; and as such it should be respected by those who write and go before the microphone to inform the public.

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WILLARD J. STONE, M. D. (65 North Madison Avenue, Pasadena).—I, too, have been impressed with the apparent increasing mortality rate among physicians from heart disease. I have, however, not been convinced that the mortality among physicians was higher from heart disease than that which has occurred among the population as a whole during the past decade. It is probably true that the physician's life of anxiety and responsibility in an age of speed in all things has decreased his average span of life, but it is likewise true that the hurry of modern life, with less time for relaxation than our ancestors enjoyed, has in all probability shortened the lives of those in other walks of life who bear equal responsibility with its attendant worries and cares. The Metropolitan Life Insurance Company has recently published its mortality rates for the first seven months of 1935. The rates of death among 100,000 industrial policyholders were given as follows:

1. Diseases of the heart (excluding pericarditis, acute endocarditis and acute myocarditis, but including disease of the coronary arteries and angina pectoris), 201.7.

2. Chronic bright's disease, including cerebral hemorrhage, but excluding acute Bright's disease and cerebral thrombosis, 127.7. It will thus be seen that heart disease and chronic Bright's disease, which include the so-called vascular hypertension group, occupied the first two places among the causes of death among their industrial policyholders. This group probably represents a general average for the population as a whole.

It has been my unfortunate experience to encounter syphilitic heart disease among physicians rather frequently. It will serve a useful purpose if someone some day will compile some data and emphasize the penalty of a negative Wassermann and Kahn test in tertiary syphilis among the professional classes who, like physicians and dentists, may suffer accidental specific infection. The possibility of such a contingency should be considered in every case of chronic heart disease among physicians, purely from the clinical findings and irrespective of the blood report.

THE FREQUENCY OF BOTULISM*

By KARL F. MEYER, Ph.D., M.D.
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IN a report[1] on the intoxications due to the ingestion of the poison generated by Cl. botulinum and parabotulinum, the data were thus summarized:

The 191 single or group intoxications reported in the United States and Canada, from 1899 to September, 1930, involved a total of 625 persons with 411 deaths. The case mortality rate had risen from 61.7 per cent in 1922 to 65.7 per cent in 1930; seventy outbreaks have been proved toxicologically and bacteriologically. For a number of years, particularly during 1926-1927, few authentic cases of botulism were reported, largely due to the after-effects of the flood of publicity which called attention to the possible danger inherent in inadequately sterilized or preserved food products, especially those home-canned.

INCREASE IN NUMBER OF INTOXICATIONS REPORTED

During the past six years a definite increase has been noted, and *in 1935 the single or group intoxications reached the alarming figure of twenty-two.* This total greatly exceeds the expectancy average, which during the period of intensive research on botulism—1918 to 1925, inclusive—was approximately thirteen outbreaks annually. In fact, it is noteworthy that eighty-six, or one-third of the total number of botulism outbreaks, occurred during the period from 1929 to 1935. It is reasonable to conclude that many of the preserving activities incident to the depression are largely responsible for this increase. However, it must be emphasized that in no instance was home-canned food, prepared and sterilized by a community cannery, involved in the intoxications.

ANALYSIS OF HISTORIES

An analysis of the histories of these tragedies leaves no doubt that, with one or two exceptions, the intoxications occurred among people in rural districts where they could not be reached by any method of warning. Understerilization or inadequate, careless curing have been the prime factors responsible for the botulinus spoilage. The majority of the unfortunate victims still used the antiquated cold-pack method of sterilization. They neither possessed the money nor the intelligence to operate successfully a pressure sterilizer. Moreover, they were not familiar with the standards of quality, and tried to salvage partly spoiled food. Home-canned string beans (sixty-nine outbreaks), approximately one-third of all the single or group intoxications due to vegetable products, continue to play an important rôle. Spoilage of this vegetable when preserved is sometimes so slight that the person opening the jar will fail to detect it. To serve string beans cold as salads, and to mask any odor which might arouse suspicion by the use of a vinegar dressing, is a common custom which only too often leads to botulism. *Until*

* From the George Williams Hooper Foundation, University of California, San Francisco.

TABLE 1.—*Geographic Distribution of the Single and Group Intoxications of Botulism During the Years 1899 to 1935*

State	Locally Grown and Home Canned	Commercially Canned or Preserved	Unknown	Total
Alabama	1	0	0	1
Arizona	0	1	0	1
California	72	17 (2 Italian)	12	101
Colorado	15	3	2	20
Connecticut	0	0	1	1
Florida	1	0	1	1
Idaho	6	0	0	6
Illinois	1	2 (1 Italian)	0	4
Indiana	1	2	0	3
Iowa	1	0	0	1
Kansas	1	0	0	1
Maine	1	0	0	1
Massachusetts	2	1	1	4
Michigan	1	3	0	4
Missouri	0	1	0	1
Montana	7	1	0	8
Nebraska	5	0	0	5
New Jersey	3	0	0	3
New Mexico	3	0	0	3
New York	7	3	2	12
North Dakota	3	0	0	3
Ohio	1	3	0	4
Oklahoma	1	0	0	1
Oregon	15	0	1	16
Pennsylvania	2	1	0	3
Tennessee	1	1	0	2
Texas	2	1	0	3
Utah	1	0	0	1
Washington	33	3	2	38
Wisconsin	1	1	0	2
Wyoming	3	2	0	5
Dominion of Canada	0	1	1	2
Total	191	47	23	261

every farmer's wife has been taught that all vegetables or other nonacid foods home-canned by the boiling water or oven process must be thoroughly boiled before they are served, botulism intoxication may be anticipated. Every agency, particularly those distributing glass jars for canning, bear a heavy responsibility. They should participate in the education of the masses as to the necessity for safe preservation of nonacid foods and for *boiling all home-canned vegetables before use.* The commercial packing industry has done its share to remove the botulinus menace. The public health workers, the home economics teachers, and the farm advisers, have done their part. The next step must be taken by the distributors of the containers commonly involved in botulism in recent years. They should discontinue the publication and dissemination of unsafe processing procedures.

SERUM THERAPY

The 261 single or group intoxications, collected over a period of thirty-six years, involved a total of 794 persons, with 517 deaths. The mortality rate has remained at 65 per cent. However, a perusal of the histories leaves no doubt that in the relatively few cases in which early serum therapy was instituted, the fatality rate has been definitely reduced. Although the case for or against the serum cannot be decided from the incomplete data, there are definite indications that the early intravenous administration of large amounts of Type A and B serum is beneficial. Furthermore, from recent personal observations in connection with an outbreak involving ten persons, it is the belief of those who saw these cases that the liberal use (one to two liters) of glucose solution (15 per cent) intravenously has been responsible for the

TABLE 2.—*Single and Group Intoxications Due to Botulism in the United States and Canada, 1899-1935*

Year	189 Home Preserved		47 Commercially Preserved		Unknown	Total
	Bacteriologically Proven	Bacteriologically Not Proven	Bacteriologically Proven	Bacteriologically Not Proven		
1899-1909	..	3	..	..	..	3
1910	..	2	..	1	..	3
1911	0	0	0	0	1	1
1912	1	2	0	2	..	5
1913	0	3	0	1	1	5
1914	1	1	1	0	..	3
1915	2	2	0	3	1	8
1916	3	2	0	0	2	7
1917	3	4	0	2	..	9
1918	3	9	0	1	1	14
1919	0	9	3	2	2	16
1920	1	3	4	2	1	11
1921	4	4	5	4	1	18
1922	11	6	1	1	4	23
1923	4	7	0	0	3	14
1924	4	4	2	2	..	12
1925	2	1	3	2	1	9
1926	1	2	0	0	0	3
1927	4	1	0	0	0	5
1928	3	3	0	0	..	6
1929	3	6	1 (Italian)	0	1	11
1930	0	5	0	0	..	5
1931	2	8	0	1 (Italian)	..	11
1932	5	10	0	0	..	15
1933	3	10	0	1 (?)	2	16
1934	0	4	1 (German)	0	1	6
1935	5	15	0	1 (?)	1	22
Total	65	126	21	26	23	261

relatively low mortality rate of 30 per cent. In combination with the antitoxin (5,000 to 10,000 units), this form of therapy deserves consideration and wider use. Velikanoff [2] has recently shown that in a series of 194 patients poisoned in Russia by the botulinus toxin, 119 were treated with serum. Only twenty-four, or 20 per cent, died, while in a series of seventy-five untreated patients the mortality was seventy, or 93 per cent. In the experience of the Russian observers, one may expect a reduction in the mortality, provided the serum is administered within the first twelve- to seventy-two hours after the ingestion of the botulinogenic food.

GEOGRAPHICAL DISTRIBUTION

As a whole, the geographical distribution of the American group intoxications has changed only slightly. The rural sections of the western states in the following order, California, Washington, Colorado, Oregon, Montana, Idaho, and Nebraska, continue to furnish the bulk of the observations (see Table 2). Oklahoma contributed its first group intoxication in 1935.

FOODS AT FAULT

In Table 3 the foods incriminated or proved to be responsible for the 261 outbreaks are listed. As already emphasized, home-canned string beans and corn continue to play an important rôle. Foreign, commercially preserved fish products and specialties have been connected with several intoxications. Unfortunately, the presence of the toxin has been demonstrated in only one of these commodities (smoked sprats). Of interest are the poisoning cases in San Jose, which followed the consumption of a fermented soy-bean mash [3] and, the three cases at Selma, California,[4] due to cheese. In both instances the vegetable mash wrapped in a cloth sack, or the casein curd placed in a ten-gallon crock with the canvas cover side down, had been buried in the soil in order to aid the fermentation. Since Cl. parabotulinum Type A, most frequently found in the earth samples of the par-

TABLE 3.—*Foods Involved in Outbreaks of Botulism 1899-1935 (December)*

String beans	69	(Three commercially packed, not proven)	
Corn	28	(One commercially canned) (One commercially packed, not proven)	
Olives	14	(Thirteen commercially packed) (One home canned)	
Spinach or chard	18	(Nine commercially packed, four proven direct, one indirect)	
Beets	11	(Two commercially packed, one proven indirectly)	
Asparagus	10	(Home canned)	
Chili peppers	6	(Home canned)	
Pears	4	(Home canned)	
Apricots	3	(Home canned)	
Figs	3	(Home canned)	
Okra	2	(Home canned)	
Peas (?)	2	(One commercially packed, not proven)	
Antipasto (Italian)	2	(Commercially packed)	
Apricot butter	1	(Home canned)	
Cauliflower	1	(Home canned)	
Celery	1	(Home canned)	
Dried beans	1	(Home canned)	
Greens and turnip tops	3	(Home canned)	
Green tomatoes	1	(Home canned)	
Home brew	1	(Home canned)	
Mangoes	1	(Home canned)	
Mushrooms	1	(Home canned)	
Peas, string beans and carrots	1	(Home canned)	
Persimmons	1	(Home canned)	
Eggplant	1	(Home canned)	
Pickles	1	(Home canned)	
Pimientoes	1	(Home canned)	
Salad dressing	1	(Home canned)	
Shallots, Muscari	1	(Commercially packed in Italy)	
Soy beans mash "Natto"	1	(Home preserved)	
Succotash	1	(Home canned)	
Squash	1	(Home canned)	
Tomato catsup	1	(Commercially packed ?)	
Tomato relish	1	(Home canned)	
Tomato juice	1	(Home canned)	
Turnips	1	(Home canned)	
Vegetable soup mixture	1	(Home canned)	
Yellow beans	1		
	199		
Porkproducts	11	(Home preserved)	
Sea food	11	(Six commercially canned)	
Beef	5	(Home preserved)	
Sardines	2	(Two commercially canned)	
Spratts	1	(Commercially canned)	
Cheese	4	(Home preserved)	
Chicken	2	(Home preserved)	
Milk	1	(Commercially canned)	
Potted meat	1	(Commercially canned)	
Sausage	1	(Commercially preserved)	
	39		
Unknown (inclusive one home prepared food)	23		
Total	261		

ticular regions in which these observations were made was isolated, it is reasonable to suspect that the food articles became impregnated with these soil anaerobes. The family who prepared the cheese descended from a race of people (Armenians) accustomed to cure their dairy products by placing them in the dry desert soil. What was, doubtless, a harmless and convenient method of preservation became a very risky procedure in a part of the world in which the spores of Cl. parabotulinum are ubiquitous. Although understerilized plant products were involved in 76.3 per cent of the cases, it is important to emphasize that animal products (14.9 per cent) continue to play a rôle in the outbreaks. Among the newer foods associated in the recent fatal cases, home-canned pork, salmon, and crab meat must be mentioned.

DIAGNOSIS

The investigation and ultimate confirmation of the clinical diagnoses leaves a great deal to be desired. It is indeed unfortunate that less than one-fourth of the intoxications were confirmed by the demonstration of the toxin in the foods apparently responsible for the illness or the deaths. The remoteness of the farms or homesteads on which these accidents occurred, the late recognition or notification of the sickness may be in part responsible. On the other hand, it is evident that the public health authorities in some of the western states failed to investigate the cases of poisoning when suitable specimens for study were still available or competent epidemiologists could have clarified the puzzling problems involved. By comparison with the period 1918 to 1924, *the interest in botulism as a public health problem has lost a great deal.* It is hoped that the distressing facts exhibited by the 1935 statistics on botulism will arouse enough curiosity for a renewed consideration of this important and generally preventable disease. Furthermore, it is the duty of the health officers and food-control agencies to wage a relentless educational campaign to acquaint the public with the inherent dangers of *inadequately processed or abnormally fermented spoiled foods.*

Third and Parnassus avenues.

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